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EXAMINER

WHIPKEY, JASON T

ART UNIT	PAPER NUMBER
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2612

DATE MAILED: 12/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/106,994

Applicant(s)

MORRIS ET AL.

Examiner

Jason T. Whipkey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 29-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 29-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 June 1998 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on September 15, 2005, has been entered.

### ***Claim Objections***

2. Claims 31 and 38 are objected to as failing to comply with 37 CFR 1.75(a) for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claims 31 and 38 both recite the limitation "the analog-to-digital converters" on line 2. There is insufficient antecedent basis for this limitation in the claims. For examination purposes, the claims will be treated as if they read, "an analog-to-digital converter".

3. Claims 31 and 38 are objected to because they both ambiguously recite "a sample and hold circuits" on line 2. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 29-32 and 36-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claims 29 and 36 recite the limitation "the digital signal" on lines 8 and 7, respectively. There is insufficient antecedent basis for this limitation in the claims. For examination purposes, the claims will be treated as if analog pixel signals are converted to digital signals prior to being stored.

Claims 30-32 and 37-40 are rejected because they are dependent on claims 29 and 36.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

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claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 29, 31-35, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elabd (U.S. Patent No. 5,754,229) in view of Baker (U.S. Patent No. 4,845,540) and Yanai (U.S. Patent No. 5,872,596).

Regarding **claims 29 and 33**, Elabd discloses an imager (see Figure 3), comprising:

an array (480) of pixel sensors (photosensitive elements 484), each pixel sensor to provide an analog signal (raw image data is inherently analog) indicative of a pixel of an image having different primary color components (color filters 462 in wheel 460 are used in front of the image sensor; see column 2, lines 45-49);

for each pixel sensor, at least two storage locations located in the array and each storage location being designated for a different one of the primary color components (storage location 490 has red, green, and blue storage areas; see column 5, lines 21-25); and

for each pixel sensor, switches to, during a first period, store the signal in one of the storage locations and, during a second period for another one of the primary color components, store the signal in another one of the storage locations

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(charge packets from each color exposure are stored in the appropriate color register [see column 5, lines 21-23]; therefore, it is inherent that some sort of switching is present to route each packet to a single register).

Elabd is silent with regard to coupling the photosensitive elements to the storage location during the integration intervals.

Baker shows a pixel sensor in Figure 2. The detector element 1 produces a current signal that is integrated by alternately switchable capacitors 2a and 2b (column 9, lines 34-45). Flip-flop circuit 17 alternately couples detector element 1 to capacitor 2a and capacitor 2b (column 10, lines 28-42). Therefore, capacitor 2a integrates charge during a first integration interval and capacitor 2b integrates charge during a second integration interval.

As stated in column 9, lines 46-52, an advantage of using a storage location to integrate current from a photodetector element directly is that the photodetector element may be operated continuously, since the photodetector need not halt operation in order to transfer integrated charge. For this reason, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have Elabd's sensor integrate charge directly in the storage locations.

Both Elabd and Baker are silent with regard to including an A/D converter in the circuitry of each pixel sensor.

Yanai discloses an image pickup device with pixels as shown in Figure 34. Each pixel includes an A/D converter 11, which allows a digital signal to be stored in the pixel's shift register 12. As stated in column 29, lines 32-37, this reduces the amount of analog information transfer, resulting in an image of higher quality. Therefore, it would have been obvious to one of

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ordinary skill in the art at the time the invention was made to have Elabd's image sensor perform A/D conversion within each pixel.

Regarding **claim 31**, Elabd is silent with regard to including a sample-and-hold circuit between the array and A/D converters.

Yanai discloses:

sample and hold circuits (10) located between the analog-to-digital converters (11) and the array (sensors 1; see column 23, lines 58-61).

An advantage of including sample and hold circuits is that slower A/D converters can be used, thus decreasing the system's cost. For this reason, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have Elabd's image sensor include the sample and hold circuit described by Yanai.

Regarding **claims 32 and 39**, Elabd discloses:

said at least two storage locations comprise at least three storage locations for each pixel sensor (see register 490 in Figure 3).

Regarding **claim 34**, Elabd discloses:

the signal indicates a first primary color component of the image during the first integration interval (see column 5, lines 21-23); and

the signal indicates another primary color component different from the first primary color component of the image during the second integration interval (see *id.*).

Yanai discloses the use of digital pixel signals, as described *supra*.

Regarding **claim 35**, Elabd discloses:

forming a pixel sensor array (480) that includes the pixel sensor (photosensitive elements 484; see Figure 3).

9. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Elabd in view of Baker and Yanai and further in view of Woywood (U.S. Patent No. 3,995,107).

**Claim 30** may be treated like claim 29. However, Elabd is silent with regard to including switches to multiplex signals from the storage locations.

Woywood discloses a CCD, including:

switches (multiplexers 32, 34, and 38 in Figure 1) to multiplex signals from the storage locations (CCD registers 20 and 24) onto an output terminal of the imager (connecting 2<sup>nd</sup> level mux 34 and display 36).

As stated in column 1, lines 52-55, an advantage of using switches to multiplex signals from storage locations is that the clock rates of the CCD registers may be half of what would otherwise be required. For this reason, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have Elabd's system include the multiplexing readout described by Woywood.

10. Claims 36 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elabd in view of Baker and Yanai and further in view of Zhou (U.S. Patent No. 5,909,026).

Regarding **claim 36**, Elabd discloses an imager (see Figure 3), comprising:

an array (480) of pixel sensors (photosensitive elements 484), each pixel sensor to provide an analog signal (raw image data is inherently analog) indicative



of a pixel of an image having different primary color components (color filters 462 in wheel 460 are used in front of the image sensor; see column 2, lines 45-49);

for each pixel sensor, at least two storage locations located in the array and each storage location being designated for a different one of the primary color components (storage location 490 has red, green, and blue storage areas; see column 5, lines 21-25); and

for each pixel sensor, switches to, during a first period, store the signal in one of the storage locations and, during a second period for another one of the primary color components, store the signal in another one of the storage locations (charge packets from each color exposure are stored in the appropriate color register [see column 5, lines 21-23]; therefore, it is inherent that some sort of switching is present to route each packet to a single register).

Elabd is silent with regard to coupling the photosensitive elements to the storage location during the integration intervals.

Baker shows a pixel sensor in Figure 2. The detector element 1 produces a current signal that is integrated by alternately switchable capacitors 2a and 2b (column 9, lines 34-45). Flip-flop circuit 17 alternately couples detector element 1 to capacitor 2a and capacitor 2b (column 10, lines 28-42). Therefore, capacitor 2a integrates charge during a first integration interval and capacitor 2b integrates charge during a second integration interval.

As stated in column 9, lines 46-52, an advantage of using a storage location to integrate current from a photodetector element directly is that the photodetector element may be operated

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continuously, since the photodetector need not halt operation in order to transfer integrated charge. For this reason, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have Elabd's sensor integrate charge directly in the storage locations.

Both Elabd and Baker are silent with regard to including an A/D converter in the circuitry of each pixel sensor.

Yanai discloses an image pickup device with pixels as shown in Figure 34. Each pixel includes an A/D converter 11, which allows a digital signal to be stored in the pixel's shift register 12. As stated in column 29, lines 32-37, this reduces the amount of analog information transfer, resulting in an image of higher quality. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have Elabd's image sensor perform A/D conversion within each pixel.

Elabd is also silent with regard to including a scaling unit.

Zhou discloses an imaging device, including:

a scaling unit (the resolution control circuit shown in Figure 1b) to selectively scale data stored in said at least two storage locations (data in each of the columns of memory array 130 is scaled; see column 3, lines 59-67).

As stated in column 1, line 46, through column 2, line 8, an advantage of performing scaling on an image is that various lighting conditions can be compensated for. For this reason, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have Elabd's image sensor including the scaling unit described by Zhou.

Regarding **claim 38**, Elabd is silent with regard to including a sample-and-hold circuit between the array and A/D converters.

Yanai discloses:

sample and hold circuits (10) located between the analog-to-digital converters (11) and the array (sensors 1; see column 23, lines 58-61).

An advantage of including sample and hold circuits is that slower A/D converters can be used, thus decreasing the system's cost. For this reason, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have Elabd's image sensor include the sample and hold circuit described by Yanai.

11. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Elabd in view of Baker, Yanai, and Zhou and further in view of Woywood.

**Claim 37** may be treated like claim 36. However, Elabd is silent with regard to including switches to multiplex signals from the storage locations.

switches (multiplexers 32, 34, and 38 in Figure 1) to multiplex signals from the storage locations (CCD registers 20 and 24) onto an output terminal of the imager (connecting 2<sup>nd</sup> level mux 34 and display 36).

As stated in column 1, lines 52-55, an advantage of using switches to multiplex signals from storage locations is that the clock rates of the CCD registers may be half of what would otherwise be required. For this reason, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have Elabd's system include the multiplexing readout described by Woywood.

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12. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Claims 36 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elabd in view of Baker, Yanai, and Zhou and further in view of Allen (U.S. Patent No. 5,982,425).

**Claim 40** may be treated like claim 36. However, Elabd is silent with regard to outputting data to a computer using a serial bus.

Allen discloses an imaging system, wherein:

a serial bus (a USB connection; see column 10, lines 1-4) to communicate data stored in said at least two storage locations (Y, U, and V buffers; see Figure 5) to a computer (see column 10, lines 1-4).

An advantage of outputting image data using a serial bus is that images may be transferred to a processing apparatus using a high speed. For this reason, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have Elabd's system output data to a computer using a serial bus.

### *Conclusion*

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Whipkey, whose telephone number is (571) 272-7321. The examiner can normally be reached Monday through Friday from 9:00 A.M. to 5:30 P.M. eastern daylight time.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ngoc-Yen Vu, can be reached at (571) 272-7320. The fax phone number for the organization where this application is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JTW

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November 25, 2005

  
NGOC-YEN VU  
PRIMARY EXAMINER